

**CLASS 329, DEMODULATORS****SECTION I - CLASS DEFINITION****A. BASIC SUBJECT MATTER OF CLASS**

This is the generic class for demodulators. A demodulator is a device which extracts an arbitrarily varying information carrying signal from a signal formed by varying a characteristic of a repetitious electrical or electromagnetic wave of less than infrared frequency in accordance with this information carrying signal. Classification herein is broadly by the type of modulation exhibited by the input signal.

**B. COMBINATIONS WITH BASIC SUBJECT MATTER INCLUDED IN THIS CLASS**

1. A demodulator combined with perfecting structure is classified here. Such structure might include, for example, a particular power supply for electronic devices within the demodulator.
2. A demodulator combined with or incorporated in other structure not otherwise classifiable is classified here. This might include, for example, a demodulator combined with an acoustical device such as a loudspeaker.
3. A combination including both a modulator and a demodulator is classified elsewhere. See Lines With Other Classes and Within This Class, below.

**C. MISCELLANEOUS SYSTEMS AND DEVICES USED WITH DEMODULATORS**

This class provides for (1) miscellaneous systems and devices which are not of general utility and which are limited to use with demodulators and (2) miscellaneous systems and devices useful with demodulators which are not otherwise classified. An example of this would be convertible demodulators which convert between different types of demodulators or which convert to or from devices other than demodulators.

**SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

A combination including both a modulator and a demodulator is classified in Class 332 where such combination is not provided for elsewhere.

Excluded from this class are pulse code demodulators

and delta modulation demodulators which are now classified elsewhere. See References to other Classes, below.

Several classes contain structure which is closely analogous to demodulators. Particularly significant among these is the art in the class for miscellaneous active electrical nonlinear devices, circuits, and systems. See the relevant SEARCH CLASS notes below in References to Other Classes in completing the search for subject matter of Class 329.

Many classes contain subject matter which includes demodulators or analogous devices as subcombinations thereof. Among these are receivers and complete communication systems (i.e., transmitters and receivers). (See References to Other Classes, below.) Therefore, these classes and others contained in the SEARCH CLASS notes below in References to Other Classes, should be considered in completing the search for subject matter of Class 329.

The terms "discriminator" and "detector" are often but not always used synonymously with "demodulator". Classification in Class 329 is appropriate where the terms "discriminator" or "detector" are recited and which clearly disclose a corresponding function of demodulation per the definition above. Classification is elsewhere where no such disclosure is present. See the SEARCH CLASS notes below in References to Other Classes, particularly those for the class for miscellaneous active electrical nonlinear devices, circuits, and systems.

Demodulators having a modulated input of less than infrared frequency which may utilize an internal optical element (e.g., an optical isolator) are classified in Class 329 by the type of modulation.

The combination of modulation converter (e.g., FM to AM) with a demodulator is classified in Class 329 according to the modulation type of the input to the converter. Modulation converters, per se, are classified elsewhere. See References to Other Classes, below.

For classification herein there must be complete extraction of the modulating signal. Mere frequency converters (e.g., RF to IF mixers) are not classified here. See References to Other Classes, below.

Class 329 provides for demodulators, per se, with structure for noise or distortion control (see Subclass References to the Current Class, below). Class 455, Telecommunications, provides for noise or interference

control in: (a) a telecommunication system (i.e., transmitter and receiver); (b) a complete telecommunication receiver; and (c) a combination of two or more receiver elements (viz. wave collector, wave mixer or modifier, demodulator, and utilization device) where the combination is not elsewhere classified. Therefore, consideration must be given to extending the search for demodulator noise control circuitry into relevant subclasses of Class 455. See also the SEARCH CLASS notes in References to Other Classes, below, relating to Class 455.

Subclasses of this class (329) relate to suppressed carrier double sideband demodulators, per se, and single/vestigial sideband demodulators, per se (see Subclass References to the Current Class, below). Class 455 accepts this subject matter in combination with what may be broadly recited diverse receiver elements (viz. wave collector, wave modifier or mixer, and utilization device). Therefore, in completing the search for demodulators of an amplitude modulated wave not having the full complement of carrier and two complete sidebands, consideration must be given to extending the search to relevant subclasses in Class 455. See also the SEARCH CLASS notes in References to Other Classes, below, relating to Class 455.

### SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

#### SEE OR SEARCH THIS CLASS, SUBCLASS:

- 318+, and 349+ for demodulators, per se, with structure for noise or distortion control.
- 356, for suppressed carrier double sideband demodulators, per se.
- 357, single/vestigial sideband demodulators, per se.

### SECTION IV - REFERENCES TO OTHER CLASSES

#### SEE OR SEARCH CLASS:

- 73, Measuring and Testing, appropriate subclasses for measuring or testing of a parameter which is typically neither electrical, optical, thermal, nor chemical and which may include a demodulation technique.
- 178, Telegraphy, subclasses 66.1+ for a teles:graphic system which transmits messages between stations using alternating or pulsating currents and particularly subclass 66.2 for such a system having a transmitter which is turned on and off, subclass 117 for a teles:graphic sys-

tem utilizing a coherer, and subclasses 118+ for teles:graphic receivers in general.

- 250, Radiant Energy, appropriate subclasses for the detection of invisible radiation or the testing of material by invisible radiation which may include a modulation - demodulation technique.
- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses for active solid-state devices used as demodulators, including subclass 10, 11, 21, 53-56, 113-118, 184-189, 225-234, 257-258, 290-294, and 414-466 for radiation-sensitive active semiconductor devices.
- 307, Electrical Transmission or Interconnection Systems, subclasses 401+ for miscellaneous nonlinear reactor systems.
- 310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric elements and devices.
- 313, Electric Lamp and Discharge Devices, appropriate subclasses for the structure of electronic tubes.
- 315, Electrical Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits with power supply or the combination of cathode-ray tube and circuit element in a unitary device, and subclasses 94+ for an electron discharge device which is an ultimate load together with a cathode or cathode heater supply circuit.
- 318, Electricity: Motive Power Systems, subclasses 606+ for servo systems utilizing a feedback signal which frequency or phase modulates a system carrier (particularly subclasses 607 and 608 for obtaining the modulating wave by reference signal frequency or phase comparison, respectively) subclass 622 for an AC lead or lag network which may include a demodulation technique, and subclasses 671+ for particular servo system motor control (particularly subclass 684 which utilizes a specific demodulator).
- 323, Electricity: Power Supply or Regulation Systems, appropriate subclasses for control of the magnitude or phase of current or voltage in a system comprising a single electrical source coupled to a single electrical load.
- 324, Electricity: Measuring and Testing, appropriate subclasses for measurement of electrical properties, in general, and particularly subclasses 76.11+ for systems measuring and testing electricity which may include demodulation, particularly subclasses 76.39+ for

- frequency measurement and subclasses 76.77+ for phase comparison, and subclass 118 for modulation of voltage or current to be measured onto a carrier combined with subsequent structure to recover a replica of the original voltage or current by demodulation.
- 327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 1+ for miscellaneous signal parameter discriminating or comparing for input signals not carrying intelligence, particularly subclasses 2+ for miscellaneous phase discriminating, subclasses 31+ for miscellaneous pulse spacing discriminating, subclasses 39+ for miscellaneous frequency discriminating, and subclasses 50+ for miscellaneous amplitude discriminating. (See Lines With Other Classes, above)
- 330, Amplifiers, subclass 10 for an amplifier having an input which is the output of a modulator and an output which is the input of a subsequent demodulator.
- 331, Oscillators, subclasses 1+ for automatic oscillator frequency stabilization using phase or frequency sensing which may include comparison with a reference oscillator or a modulation technique, subclasses 46+ for plural oscillator systems in general, and subclass 58 for an oscillator with structure to perform an additional simultaneous function.
- 332, Modulators, subclasses 100+ for a frequency shift keying modulator, subclasses 103+ for a phase shift keying modulator, subclasses 106+ for a pulse modulator, subclasses 117+ for a frequency modulator, subclasses 144+ for a phase modulator and subclasses 149+ for an amplitude modulator; subclasses 183+ for modulation converters, per se.
- 333, Wave Transmission Lines and Networks, subclasses 24+ for transmission line coupling networks (particularly subclasses 25+ for balanced to unbalanced circuits, subclasses 138+ for lumped parameter delay lines, and subclasses 165 - 212 for filters), subclasses 236+ for long lines, per se, and subclasses 245+ for long line elements and components.
- 334, Tuners, appropriate subclasses for tuner circuits, per se, which may include a broad recitation of a demodulator plus details of a tuner and particularly subclasses 30+ for a tuner with a resonance indicator in which a demodulator may be used and subclass 39 for tuners combined with other devices which may include a demodulator recited broadly.
- 336, Inductor Devices, appropriate subclasses for electrical circuit elements exhibiting inductive properties.
- 338, Electrical Resistors, subclass 1 for a coherer-type resistor and subclasses 13+ for a resistor whose resistance value varies in response to a condition such as temperature or magnetic field.
- 340, Communications: Electrical, subclasses 870.01+ for telemetry systems and especially subclasses 870.18+ indented thereunder for such systems where the quantity to be telemetered is imposed on a carrier by a particular type of modulation.
- 341, Coded Data Generation or Conversion, subclasses 126+ for a pulse code demodulator, per se, and subclass 143 for a delta modulation demodulator, per se.
- 342, Communications: Directive Radio Wave Systems and Devices (e.g., Radar, Radio Navigation), subclasses 350+ for directive radio wave systems which may include demodulation techniques and particularly subclasses 385+ for a directive beacon or receiver.
- 348, Television, subclasses 638+ for a demodulator particularly adapted for extracting a component of a natural color television signal from a carrier or subcarrier, subclasses 726+ for television signal receivers and subcombination thereof.
- 358, Facsimile and Static Presentation Processing, subclass 469 for modulation onto a carrier of a facsimile signal derived from scanning a picture or for demodulation of such a modulated carrier to reconstruct the picture.
- 360, Dynamic Magnetic Information Storage or Retrieval, subclass 28 for control of a demodulator by a reference carrier signal stored concurrently with the information signal to be demodulated and subclasses 29+ for dynamic magnetic recording or reproducing containing particular demodulator circuitry.
- 363, Electric Power Conversion Systems, particularly subclasses 13+ for current conversion which includes generic AC to DC rectifiers and generic DC to AC inverters of diverse type.
- 367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 134 for acoustic wave demodulation in an underwater telemetry system.
- 369, Dynamic Information Storage or Retrieval, subclass 90 for demodulation of a previously modulated quadruphonic subchannel signal after retrieval.

- 370, Multiplex Communications, appropriate subclasses for multiplexing systems which may utilize demodulation techniques.
- 374, Thermal Measuring and Testing, appropriate subclasses for measurement systems responsive to an external thermal condition which may utilize a modulation technique.
- 375, Pulse or Digital Communications, appropriate subclasses for demodulators combined with receiving structure to couple a modulated pulse wave from a transmission medium (i.e., a receiver) or complete systems (i.e., transmitter and receiver) incorporating such a combination, particularly subclasses 237 through 242 + for a system or receiver utilizing pulse number modulation, pulse width modulation, pulse position, frequency, or spacing modulation, pulse amplitude modulation, or pulse code modulation, subclasses 259+ for other diverse types of digital communication systems which may include a particular demodulator, and subclasses 316+ for other diverse types of digital communication receivers which may include a particular demodulator. (also see Lines With Other Classes, above)
- 380, Cryptography, for all electrical communications equipment which process an information signal for purposes of concealment.
- 381, Electrical Audio Signal Processing Systems and Devices, subclasses 1+ for broadcast stereophonic signal processing not elsewhere classified.
- 386, Television Signal Processing for Dynamic Recording or Reproducing, subclasses 26+ for frequency modulation of a color television signal.
- 455, Telecommunications, appropriate subclasses for nondigital demodulators combined with receiving structure to couple a modulated wave from a transmission medium (i.e., a receiver) or complete systems (i.e., transmitter and receiver) incorporating such a combination, particularly subclass 21 for frequency conversion in a repeater including a demodulator, subclasses 39+ for separated transmitter and receiver which may include a particular demodulator, subclasses 73+ for a transceiver which may include a particular demodulator, and subclasses 130+ for a telecommunications receiver which may include a particular demodulator; subclasses 202 and 204 for suppressed carrier double sideband demodulators, per se, and single/vestigial sideband demodulators, in combination with what may be broadly

recited diverse receiver elements (viz. wave collector, wave modifier or mixer, and utilization device); subclasses 313+ for mere frequency converters (e.g., RF to IF mixers). (also see Lines With Other Classes, above)

## SECTION V - GLOSSARY

### ARBITRARILY VARYING

Indicates having a future value which is not predictable from past values. (Arbitrary is the opposite of repetitious).

### CARRIER

An electrical or electromagnetic repetitious sinusoidal wave.

### CHARACTERISTIC

An attribute associated with the size or shape of a wave or signal. Examples are amplitude, frequency, or phase of a sine wave and repetition rate, position, amplitude, or width of a nonsine wave.

### DEMODULATOR

A device which extracts an arbitrarily varying modulating signal from an electrical or electromagnetic modulated signal of less than infrared frequency.

### MODULATED SIGNAL

A repetitious wave which has had a characteristic thereof varied by a modulating signal.

### MODULATING SIGNAL

An information carrying signal whose informational content is to be impressed on a carrier or pulse wave.

### MODULATOR

A device which varies a characteristic of a repetitious electrical or electromagnetic wave of less than infrared frequency in accordance with a characteristic of an arbitrarily varying modulating signal.

### PULSE WAVE

An electrical or electromagnetic repetitious nonsinuso-

dal wave. Examples are square wave, saw-tooth wave, or trapezoidal wave.

#### REPETITIOUS WAVE

A cyclic wave whose individual component cycles are substantially identical. Examples of repetitious waves are sine waves, square waves, saw-tooth waves and trapezoidal waves.

#### SUBCLASSES

#### **300 FREQUENCY SHIFT KEYING OR MINIMUM SHIFT KEYING DEMODULATOR:**

This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from a signal which has undergone frequency shift keying modulation or minimum shift keying modulation.

- (1) Note. Frequency shift keying modulation occurs when the frequency of a carrier is shifted among a plurality of discrete values in accordance with the modulating signal.
- (2) Note. Minimum shift keying modulation is a type of frequency shift keying modulation in which there is phase continuity at the frequency transition points.
- (3) Note. This subclass includes frequency shift keying demodulators, per se. See the SEARCH CLASS notes below for combinations with the subject matter of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

304+, for a phase shift keying demodulator.

SEE OR SEARCH CLASS:

375, Pulse or Digital Communications, subclasses 272+ for a frequency shift keying system (i.e., transmitter and receiver) and subclasses 322+ for a frequency shift keying demodulator combined with receiving structure.

#### **301 Including discrete semiconductor device:**

This subclass is indented under subclass 300. Subject matter containing an electrical device whose constituent portions are constructed

from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

#### **302 Input signal combined with local oscillator or carrier frequency signal:**

This subclass is indented under subclass 300. Subject matter where the modulated signal input to the demodulator interacts with oscillations from a secondary source.

- (1) Note. The secondary oscillations may be internally generated or externally supplied and may be at a frequency other than that of the modulated input signal's carrier.

SEE OR SEARCH THIS CLASS, SUBCLASS:

306+, for similar structure in a phase shift keying or quadrature amplitude demodulator.

323+, for similar structure in a frequency modulation demodulator.

346, for similar structure in a phase modulation demodulator.

358+, for similar structure in an amplitude modulation demodulator.

#### **303 Including logic element (e.g., logic gate or flip-flop):**

This subclass is indented under subclass 300. Subject matter containing a component which performs a Boolean Algebraic operation.

- (1) Note. Such components may be combinational or sequential (e.g., AND gates, OR gates or J-K flip-flops).

#### **304 PHASE SHIFT KEYING OR QUADRATURE AMPLITUDE DEMODULATOR:**

This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from a signal which has undergone phase shift keying modulation or quadrature amplitude modulation.

- (1) Note. Phase shift keying modulation occurs when the phase of a carrier is shifted among a plurality of discrete angles in accordance with the modulating signal.
- (2) Note. Quadrature amplitude modulation occurs when the phase and amplitude of a carrier is simultaneously shifted among a plurality of discrete angle/magnitude pairs.
- (3) Note. This subclass includes phase shift keying demodulators or quadrature amplitude demodulators, per se. See the SEARCH CLASS notes below for combinations with the subject matter of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

300+, for a frequency shift keying demodulator.

SEE OR SEARCH CLASS:

375, Pulse or Digital Communications, subclass 261 for a quadrature amplitude modulation system (i.e., transmitter and receiver), subclasses 279+ for a phase shift keying system, and subclasses 322+ for a phase shift keying demodulator combined with receiving structure.

### **305 Including discrete semiconductor device:**

This subclass is indented under subclass 304. Subject matter containing an electrical device whose constituent portions are constructed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

### **306 Input signal combined with local oscillator or carrier frequency signal:**

This subclass is indented under subclass 304. Subject matter where the modulated signal input to the demodulator interacts therein with oscillations from a secondary source.

- (1) Note. The secondary oscillations may be internally generated or externally supplied and may be at a frequency other than that of the modulated input signal's carrier.

SEE OR SEARCH THIS CLASS, SUBCLASS:

302, for similar structure in a frequency shift keying or minimum shift keying demodulator.

323+, for similar structure in a frequency modulation demodulator.

346, for similar structure in a phase modulation demodulator.

358+, for similar structure in an amplitude modulation demodulator.

### **307 Including phase or frequency locked loop:**

This subclass is indented under subclass 306. Subject matter in which a phase or frequency locked loop provides stability to or synchronization with the secondary source of oscillations.

SEE OR SEARCH CLASS:

331, Oscillators, subclasses 1+ for phase or frequency locked loops, per se.

375, Pulse or Digital Communications, subclass 327 and 376 for phase locked loops in digital receivers or synchronizers, respectively.

### **308 With parallel signal combiners (e.g., costas loop):**

This subclass is indented under subclass 307. Subject matter utilizing a plurality of signal combiners where the modulated input signal is combined with relatively phase shifted versions of the secondary oscillations, or where the secondary oscillations are combined with relatively phase shifted versions of the modulated input signal.

**309 Including logic element (e.g., logic gate or flip-flop):**

This subclass is indented under subclass 308. Subject matter containing a component which performs a Boolean Algebraic operation.

- (1) Note. Such components may be combinational or sequential (e.g., AND gates, OR gates or J-K flip-flops).

**310 Including logic element (e.g., logic gate or flip-flop):**

This subclass is indented under subclass 304. Subject matter containing a component which performs a Boolean Algebraic operation.

- (1) Note. Such components may be combinational or sequential (e.g., AND gates, OR gates or J-K flip-flops).

**311 PULSE OR INTERRUPTED CONTINUOUS WAVE DEMODULATOR:**

This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from a modulated signal which has undergone pulse modulation.

- (1) Note. Pulse modulation occurs when a repetitious pulse wave has a characteristic varied in accordance with the modulating signal.
- (2) Note. Interrupted continuous wave modulation occurs when a pulsed continuous wave has a characteristic varied in accordance with the modulating signal.
- (3) Note. Examples of pulse waves are square waves, sawtooth waves, and trapezoidal waves.
- (4) Note. Comparable structure having an input which is pulse code modulated (PCM) or delta modulated are found elsewhere. See the Search Notes below.
- (5) Note. This subclass includes pulse demodulators, per se. See the SEARCH CLASS notes below for combinations with the subject matter of this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 315+, for a frequency modulation demodulator.
- 341+, for an FM demodulator which initially transforms the input signal into pulses.
- 345+, for a phase modulation demodulator.
- 347+, for an amplitude modulation demodulator.

SEE OR SEARCH CLASS:

- 341, Coded Data Generation or Conversion, subclasses 126+ or 143 for a structure comparable structure to this subclass (311) having an input which is pulse code modulated (PCM) or delta modulated.
- 375, Pulse or Digital Communications, appropriate subclasses, for combinations of a pulse demodulator with receiving structure.

**312 Pulse width demodulator:**

This subclass is indented under subclass 311. Subject matter where the modulated signal input to the demodulator has undergone pulse width modulation.

- (1) Note. Pulse width modulation is a form of pulse modulation in which the width (duration) of the pulses is the characteristic that is varied.

SEE OR SEARCH CLASS:

- 375, Pulse or Digital Communications, subclass 238 or 340+ for a combination of pulse width demodulator with receiving structure.

**313 Pulse position, frequency, phase or spacing demodulator:**

This subclass is indented under subclass 311. Subject matter where the modulated signal input to the demodulator has undergone pulse position, frequency, phase or spacing modulation.

- (1) Note. Pulse position, frequency, phase or spacing modulation are forms of pulse modulation where the characteristics being varied are the relative positions of the pulses, the frequency (repetition rate)

of the pulses, the phase of the pulses, or the spacing (time) between the pulses.

**SEE OR SEARCH CLASS:**

375, Pulse or Digital Communications, subclass 239 or 340+ for a combination of pulse position, frequency or spacing demodulator with receiving structure.

**314 Including discrete semiconductor device:**  
This subclass is indented under subclass 313. Subject matter containing an electrical device whose constituent portions are constructed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

**315 FREQUENCY MODULATION DEMODULATOR:**  
This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from a modulated signal which has undergone frequency modulation.

- (1) Note. Frequency modulation occurs when the frequency of a carrier is varied over a continuum of values in accordance with the modulating signal.
- (2) Note. This subclass includes frequency modulation demodulators, per se. See the SEARCH CLASS notes below for combinations with subject matter of this subclass.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

300+, for a frequency shift keying or minimum shift keying demodulator.

311+, for a pulse modulation demodulator.

345+, for a phase modulation demodulator.

347+, for an amplitude modulation demodulator.

**SEE OR SEARCH CLASS:**

455, Telecommunications, subclasses 42+ for frequency demodulation in a system with separated transmitter and receiver, and subclasses 205+ for a combination of frequency demodulator with receiving structure.

**316 Plural demodulation:**  
This subclass is indented under subclass 315. Subject matter which utilizes a diverse intermediate type of demodulator within the FM demodulator or combines the outputs of a plurality of FM demodulators or has an output selectable from a plurality of demodulators one of which must be an FM type.

**317 Including amplitude demodulation:**  
This subclass is indented under subclass 316. Subject matter which utilizes an intermediate amplitude demodulator.

**318 Having specific distortion, noise or other interference prevention, reduction or compensation:**  
This subclass is indented under subclass 315. Subject matter including the neutralization of an undesirable characteristic of a frequency modulation demodulator or its signals.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

349+, for distortion or noise control in an amplitude modulation demodulator.

**SEE OR SEARCH CLASS:**

455, Telecommunications, subclasses 63+ and 501+ for noise control in a telecommunication system with separated transmitter and receiver, subclasses 210+ for carrier amplitude modulation elimination in an FM receiver and subclasses 296+ for receiver noise or interference control, particularly subclasses 309 and 312.

**319 Using feedback to reduce distortion, noise or other interference:**  
This subclass is indented under subclass 318. Subject matter which utilizes a returned portion of the output signal to achieve neutralization.



**320 By cancelling distortion, noise or other interference:**

This subclass is indented under subclass 318. Subject matter which combines a derived error or deviation signal with an intermediate demodulator signal to achieve neutralization of an undesirable characteristic in the final demodulator output.

**321 Using amplitude limiting within the demodulator:**

This subclass is indented under subclass 318. Subject matter which restricts the magnitude of signal fluctuations within the demodulator itself to achieve the neutralization.

SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 308+ and particularly subclass 309 for amplitude limiting in a receiver noise elimination structure.

**322 Including microwave or distributed parameter structure:**

This subclass is indented under subclass 315. Subject matter utilizing a structure or device which is peculiar to microwave frequencies or which has resistance, inductance or capacitance not concentrated in lumped circuit elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

354, for similar structure in an amplitude modulation demodulator.

**323 Input signal combined with local oscillator or carrier frequency signal:**

This subclass is indented under subclass 315. Subject matter where the modulated signal input to the demodulator interacts therein with oscillations from a secondary source.

- (1) Note. The secondary oscillations may be internally generated or externally supplied and may be at a frequency other than that of the modulated input signal's carrier.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 302, for similar structure in a frequency shift keying or minimum shift keying demodulator.  
306+, for similar structure in a phase shift keying or quadrature amplitude demodulator.  
346, for similar structure in a phase modulation demodulator.  
358+, for similar structure in an amplitude modulation demodulator.

SEE OR SEARCH CLASS:

- 455, Telecommunications, subclasses 208+ for synchronized or controlled local oscillator in a FM receiver and subclasses 255+ for generic local oscillator frequency control in a receiver.

**324 Input signal applied directly to local oscillator:**

This subclass is indented under subclass 323. Subject matter in which the modulated input signal has a direct interaction with the secondary source of oscillations and where the modulating signal is extracted directly therefrom.

**325 Including phase or frequency locked loop:**

This subclass is indented under subclass 323. Subject matter in which a phase or frequency locked loop provides stability to the secondary source of oscillations.

SEE OR SEARCH CLASS:

- 331, Oscillators, subclasses 1+ for phase or frequency locked loops, per se.  
455, Telecommunications, subclass 260 for phase lock loop or frequency synthesizer in a receiver.

**326 Including discrete semiconductor device:**

This subclass is indented under subclass 325. Subject matter containing an electrical device whose constituent portions are constructed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.
- 327 Input signal split into plural signals:**  
This subclass is indented under subclass 315. Subject matter where the modulated signal input to the demodulator is separated into a plurality of closely analogous or identical representations.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
363+, for input signal splitting in an AM demodulator.
- 328 Including piezoelectric resonant element:**  
This subclass is indented under subclass 327. Subject matter which incorporates a resonant component having the ability to transform mechanical energy into electrical energy (e.g., piezoelectric).
- (1) Note. Piezoelectric resonant elements are typically crystals.
- SEE OR SEARCH CLASS:  
310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric elements, per se.
- 329 Using a transformer to split input signal:**  
This subclass is indented under subclass 327. Subject matter in which the separated signal representations are obtained at the various wound portions of a transformer (e.g., primary or secondary windings).
- 330 Signals taken from primary and secondary windings:**  
This subclass is indented under subclass 329. Subject matter where representations of the modulated input signal are extracted from the primary and the secondary windings of the transformer.
- 331 Including plural detector diodes (e.g., ratio detector type):**  
This subclass is indented under subclass 330. Subject matter which additionally utilizes a plurality of diodes in demodulation.
- (1) Note. An example of this structure is a ratio detector where the ratio of a pair of diode rectified currents is proportional to frequency variations of an input signal.
- 332 Signals taken from plural secondary windings:**  
This subclass is indented under subclass 329. Subject matter where representations of the modulated input signal are extracted from plural secondary windings of the transformer.
- 333 Including plural detector diodes (e.g., ratio detector type):**  
This subclass is indented under subclass 332. Subject matter which additionally utilizes a plurality of diodes in demodulation.
- (1) Note. An example of this structure is a ratio detector where the ratio of a pair of diode rectified currents is proportional to frequency variations of an input signal.
- 334 Including resonant circuits tuned above and below input signal carrier frequency:**  
This subclass is indented under subclass 333. Subject matter which additionally utilizes a pair of tuned circuits having resonant frequencies above and below the carrier frequency of the input signal.
- 335 Including plural detector diodes (e.g., ratio detector type):**  
This subclass is indented under subclass 329. Subject matter which additionally utilizes a plurality of diodes in demodulation.
- (1) Note. An example of this structure is a ratio detector where the ratio of a pair of diode rectified currents is proportional to frequency variations of an input signal.
- 336 Input signal combined with phase shifted or delayed portion of input signal:**  
This subclass is indented under subclass 327. Subject matter in which an unmodified modulated signal is subsequently combined with a time delayed version thereof.
- (1) Note. Such a time delay can also be considered to be a phase shift.

## SEE OR SEARCH CLASS:

455, Telecommunications, subclass 304 for phase shifting among plural signal paths used in receiver noise elimination.

**337 Including lc resonant phase shift circuit:**

This subclass is indented under subclass 336. Subject matter in which an inductive-capacitive resonant network provides the required phase shift.

**338 Input signal split by lc resonant circuit:**

This subclass is indented under subclass 327. Subject matter in which the input signal is separated into plural representations by an inductive-capacitive resonant circuit.

**339 Including lc resonant circuits tuned above and below input signal carrier frequency:**

This subclass is indented under subclass 338. Subject matter utilizing a pair of inductive-capacitive tuned circuits having resonant frequencies above and below the carrier frequency of the input signal.

**340 Including plural detector diodes (e.g., ratio detector type):**

This subclass is indented under subclass 327. Subject matter which additionally utilizes a plurality of diodes in demodulation.

- (1) Note. An example of this structure is a ratio detector where the ratio of a pair of diode rectified currents is proportional to frequency variations of an input signal.

**341 Input signal converted to and processed in pulse form (e.g., pulse counter or digital type demodulator):**

This subclass is indented under subclass 315. Subject matter in which the frequency modulated input signal is first changed to a pulse equivalent and then processed.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

311+, for pulse demodulators, per se.

**342 Including discrete semiconductor device:**

This subclass is indented under subclass 341. Subject matter containing an electrical device whose constituent portions are constructed

from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

**343 Including digital logic circuitry:**

This subclass is indented under subclass 341. Subject matter which includes processing circuitry which is not exclusively of an analog nature.

- (1) Note. Such components include, for example, AND gates, OR gates, and J-K flip-flops.

**344 Input signal passed through single demodulating path including resonant circuit:**

This subclass is indented under subclass 315. Subject matter in which the modulated input signal transits a single demodulating circuit path which contains a tuned circuit.

**345 PHASE MODULATION DEMODULATOR:**

This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from a modulated signal which has undergone phase modulation.

- (1) Note. Phase modulation occurs when the phase of a carrier is varied over a continuum of values in accordance with the modulating signal.
- (2) Note. This subclass includes phase modulation demodulators, per se. See SEARCH CLASS notes below for combinations with the subject matter of this subclass.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

304+, for a phase shift keying or quadrature amplitude demodulator.

311+, for a pulse demodulator.

315+, for a frequency demodulator.

347+, for an amplitude demodulator.

## SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 42+ for phase demodulation in a system with separated transmitter and receiver, and subclasses 205+ for a combination of phase demodulator with receiving structure.

**346 Input signal combined with local oscillator or carrier frequency signal:**

This subclass is indented under subclass 345. Subject matter where the modulated signal input to the demodulator interacts therein with oscillations from a secondary source.

- (1) Note. The secondary oscillations may be internally generated or externally supplied and may be at a frequency other than that of the modulated input signal's carrier.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

302, for similar structure in a frequency shift keying or minimum shift keying demodulator.  
 306+, for similar structure in a phase shift keying or quadrature amplitude demodulator.  
 323+, for similar structure in a frequency modulation demodulator.  
 358+, for similar structure in an amplitude modulation demodulator.

## SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 208+ for a synchronized or controlled local oscillator in a phase modulation receiver and subclasses 255+ for generic local oscillator frequency control in a receiver.

**347 AMPLITUDE MODULATION DEMODULATOR:**

This subclass is indented under the class definition. Subject matter where the demodulator extracts the modulating signal from an input AM signal.

- (1) Note. Amplitude modulation is achieved by varying the amplitude of a carrier over a continuum of values in accordance with a modulating signal.

- (2) Note. This subclass includes amplitude modulation demodulators, per se. See the SEARCH CLASS note below for combinations with the subject matter of this subclass.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

311+, for a pulse demodulator.  
 315+, for frequency modulation demodulator.  
 345+, for a phase modulation demodulator.

## SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 130+ for a telecommunication receiver utilizing an amplitude modulation demodulator as a subcombination thereof.

**348 Having plural demodulation outputs:**

This subclass is indented under subclass 347. Subject matter where there are more than one output signal which as undergone demodulation, one of which must have undergone amplitude demodulation.

**349 Having specific distortion, noise or other interference prevention, reduction or compensation:**

This subclass is indented under subclass 347. Subject matter including the neutralization of an undesirable characteristic of an amplitude modulation demodulator or its signals.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

318+, for distortion or noise control in a frequency modulation demodulator.

## SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 63+ and 501+ for noise control in a telecommunication system with separated transmitter and receiver, and subclasses 296+ for receiver noise or interference control, particularly subclasses 309 and 312.

**350 Automatic amplitude stabilization or control:**

This subclass is indented under subclass 349. Subject matter in which undesirable fluctuations in the magnitude of a demodulator signal are eliminated or reduced.

**351 Nonlinearity reduction or compensation:**

This subclass is indented under subclass 349. Subject matter where an undesirable nonlinear characteristic of a demodulator, its components or its signals is neutralized.

**352 Temperature compensation:**

This subclass is indented under subclass 349. Subject matter in which undesirable effects of ambient temperature on a demodulator are diminished.

**353 Noise reduction or compensation:**

This subclass is indented under subclass 349. Subject matter in which undesired signal components superimposed upon a desired demodulator signal are attenuated.

- (1) Note. In some instances, noise is generated due to an inherent characteristic of a demodulator circuit component.

**354 Including microwave or distributed parameter structure:**

This subclass is indented under subclass 347. Subject matter utilizing a structure or device which is peculiar to microwave frequencies or which has resistance, inductance or capacitance not concentrated in lumped circuit elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 322, for similar structure in a frequency modulation demodulator.

**355 With electron discharge device:**

This subclass is indented under subclass 354. Subject matter utilizing a device which has electrical current flow between two spaced electrodes in a gas, vapor or vacuum.

- (1) Note. This might include, for example, vacuum or gas tubes such as diodes, triodes or pentodes.

- (2) Note. Additional control electrodes may be present.

**356 Suppressed carrier double sideband type:**

This subclass is indented under subclass 347. Subject matter where the input AM signal has had the carrier attenuated and both sidebands are present.

SEE OR SEARCH CLASS:

- 455, Telecommunications, subclass 46 for a suppressed carrier system having separated transmitter and receiver and subclass 202 for a suppressed carrier-type receiver.

**357 Single or vestigial sideband type:**

This subclass is indented under subclass 347. Subject matter where the input AM signal has less than two complete sidebands present.

- (1) Note. The carrier may or may not be present in the input signal.

SEE OR SEARCH CLASS:

- 455, Telecommunications, subclass 47 for a single or vestigial sideband system with separated transmitter and receiver and subclasses 203 or 204 for a single sideband or vestigial sideband-type receiver, respectively.

**358 Input signal combined with local oscillator or carrier frequency signal (e.g., synchronous demodulator):**

This subclass is indented under subclass 347. Subject matter where the modulated signal input to the demodulator interacts therein with oscillations from a secondary source.

- (1) Note. The secondary oscillations may be internally generated or externally supplied and may be at a frequency other than that of the modulated input signal's carrier.
- (2) Note. A synchronous demodulator uses a local carrier frequency signal synchronized with the carrier of the modulated input signal to cancel out the modulated input signal's carrier.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 302, for similar structure in a frequency shift keying or minimum shift keying demodulator.
- 306+, for similar structure in a phase shift keying or quadrature amplitude demodulator.
- 323+, for similar structure in a frequency modulation demodulator.
- 346, for similar structure in a phase modulation demodulator.

SEE OR SEARCH CLASS:

- 455, Telecommunications, subclasses 255+ for generic local oscillator frequency control in a receiver.

**359 Input signal applied directly to local oscillator:**

This subclass is indented under subclass 358. Subject matter where the input AM signal interacts directly with the local secondary source of oscillations.

**360 Including phase or frequency locked loop:**

This subclass is indented under subclass 358. Subject matter in which frequency stability is provided to the secondary source of oscillations by a phase or frequency locked loop.

SEE OR SEARCH CLASS:

- 331, Oscillators, subclasses 1+ for phase or frequency locked loops, per se.
- 455, Telecommunications, subclass 260 for phase locked loop or frequency synthesizer in a receiver.

**361 Including sampling, gating or switching:**

This subclass is indented under subclass 358. Subject matter which additionally includes signal processing of an interruptive or discrete nature.

- (1) Note. This may include, for example, chopping of the modulated input signal.

**362 With three or more terminal discrete semiconductor device:**

This subclass is indented under subclass 361. Subject matter utilizing an electrical device with three external connection points where the constituent portions of the device are con-

structed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

**363 Input signal split into plural signals:**

This subclass is indented under subclass 347. Subject matter in which the modulated signal input to the demodulator is separated into a plurality of closely analogous or identical representations.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 327+, for input signal splitting in a frequency modulation demodulator.

**364 Including three or more terminal discrete semiconductor device:**

This subclass is indented under subclass 363. Subject matter utilizing an electrical device with three external connection points where the constituent portions of the device are constructed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

**365 Including diode demodulator device:**

This subclass is indented under subclass 363. Subject matter utilizing a unidirectional electrical element as demodulator.

- (1) Note. The diodes of this subclass may be either semiconductor or tube type.

**366 Plural diodes:**

This subclass is indented under subclass 365. Subject matter having a plurality of demodulating unidirectional electrical elements.

**367 Including regenerative feedback in nonoscillating demodulator:**

This subclass is indented under subclass 347. Subject matter in which an AM demodulator, not requiring a supplemental source of oscillations to achieve demodulation, positively feeds back a portion of its output to provide signal enhancement.

**368 Electron discharge demodulator device having more than two electrodes (e.g., triode, tetrode, etc.):**

This subclass is indented under subclass 347. Subject matter in which an AM demodulator utilizes a device which has electrical current flow between two spaced electrodes in a gas, vapor or vacuum and which current flow is controlled by an additional electrode.

**369 Including three or more terminal discrete semiconductor demodulator device:**

This subclass is indented under subclass 347. Subject matter in which the AM demodulator utilizes an electrical device with three external connection points where the constituent portions of the device are constructed from solid material having room temperature conductivity between that of a conductor and an insulator and which conductivity is typically modified through the addition of small amounts of dopant.

- (1) Note. This might include, for example, semiconductor diodes or transistors of diverse type.

**370 Including diode demodulator device:**

This subclass is indented under subclass 347. Subject matter where the AM demodulator incorporates a unidirectional electrical element.

- (1) Note. The diodes of this subclass may be either semiconductor or tube type.

**371 Coherer type demodulator:**

This subclass is indented under subclass 347. Subject matter where the demodulating element includes conductors loosely resting against each other in imperfect conducting contact, the conductors being of such a material and shape that passage of a high frequency cur-

rent therethrough modifies the conducting contact.

- (1) Note. Usually the demodulating element is formed from loosely packed metallic granules, whose contact resistance decreases upon passage of a high frequency current therethrough. However, the contact resistance may increase under these conditions to constitute an anticoherer, which is also included here.
- (2) Note. The coherer often includes structure, namely, a decoherer, for breaking the coherence established by the high frequency current.

**SEE OR SEARCH CLASS:**

- 178, Telegraphy, subclass 117 for an alternating current telegraphic system utilizing a coherer.
- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 43 for active solid-state type coherers.
- 338, Electrical Resistors, subclass 1 for coherer-type resistors, per se.

**372 MISCELLANEOUS:**

This subclass is indented under the class definition. Subject matter not provided for in any previous subclass.

END